

LATCH SYSTEM FOR VIDEO MONITOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to video monitors and more particularly to a latch system for retaining a display housing within a stowage cavity of a video monitor console.

2. Antecedents of the Invention

Overhead mounted video monitors, particularly in vehicular applications, generally comprised an LCD or other flat screen display housing pivotally joined to a ceiling mounted console. The display housing rotated from a stowed position, within an open stowage cavity of the console, to a viewing position. Various latch systems have been utilized for maintaining the display housing within the stowage cavity and for releasing the housing, such that the display housing could be pivoted to the viewing position.

Generally, the prior latch systems comprised either a mechanical slide actuation latch release, wherein an operator hand engageable latch knob was slid linearly, or a push button latch mechanism. In push button mechanisms, a button was pressed upwardly, into a ceiling mounted console. Through a suitable mechanical linkage, lateral displacement of a latch out of engagement with the display monitor resulted.

Among the disadvantages of these prior latching systems included their inability to be readily integrated with processor controlled video monitor systems. Further, the prior mechanical latching systems included multiple components which often required maintenance, including lubrication. The latch structures themselves comprised multiple parts and associated assembly costs.

SUMMARY OF THE INVENTION

A processor implemented video monitor includes a display housing hinged to an overhead console. The display housing is stowed in an open stowage cavity of the console and is maintained in its stowed position by a latch detent pin which projects through an opening in a cavity wall and engages a recess, aperture or slot in a wall of the housing. The detent pin is retracted by a solenoid mounted within the console for releasing the display housing for deployment to a viewing position.

A shallow finger well having exposed touch sensor terminals is formed in the console. Upon placement of a finger in the well and against the terminals, a solenoid driving circuit actuates the solenoid to retract the latch and permit the display housing to lower to a deployed position. The solenoid is optionally actuated through the processor, as by response to a remote control signal sensor or a membrane keypad.

The processor includes a nonvolatile memory which stores a display housing position signal when power is disconnected, as by a vehicle ignition switch. The processor

actuates the solenoid to restore the last housing position upon power up, if the housing was moved to a stowed position during power off.

From the foregoing compendium, it will be appreciated that it is an aspect of the present invention to provide a latch system for a video monitor of the general character described which is not subject to the disadvantages of the antecedents of the invention aforementioned.

A feature of the present invention is to provide a latch system for a video monitor of the general character described which is easy to use.

A consideration of the present invention is to provide a latch system for a video monitor of the general character described having relatively low maintenance requirements.

A further aspect of the present invention is to provide a latch system for a video monitor of the general character described which is well suited for economical mass production fabrication.

A further consideration of the present invention is to provide a latch system for a video monitor of the general character described which employs but a modicum of moving components.

A further aspect of the present invention is to provide a latch system for a video monitor of the general character described which is relatively low in cost.

A further feature of the present invention is to provide a latch system for a video

monitor of the general character described which is actuated through engagement of a touch sensor.

Yet a further consideration of the present invention is to provide a latch system for a video monitor of the general character described which is actuatable through a wireless remote control.

To provide a latch system for a video monitor of the general character described which is well adapted for implementation in a processor controlled video monitor is yet a further aspect of the present invention.

Another consideration of the present invention is to provide a latch system for a video monitor of the general character described which is actuatable by finger placement in a shallow surface depression of a console.

A still further feature of the present invention is to provide a latch system for a video monitor of the general character described which may be engaged to automatically restore a video panel housing position, in the event the housing was stowed while the monitor was powered off.

Other aspects, features and considerations of the present invention in part will be obvious and in part will be pointed out hereinafter.

With these ends in view, the invention finds embodiment in certain combinations of elements, arrangements of parts and series of steps by which the said aspects, features and

considerations and certain other aspects, features and considerations are attained, all with reference to the accompanying drawings and the scope of which will be more particularly pointed out and indicated in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings in which is shown one of the various possible exemplary embodiments of the invention,

FIG. 1 is a perspective illustration of a video monitor having a latch system constructed in accordance with and embodying the invention and illustrating an overhead console and a pivotally mounted display housing with the housing being stowable in an open stowage cavity of the console,

FIG. 2 is a bottom plan view of the video monitor with the display housing being in a stowed position and illustrating shallow finger well of the latch system including a pair of touch contacts,

FIG. 3 is an enlarged scale fragmentary sectional view through the console and display housing and illustrating a solenoid having a slidable core including a detent pin, with the latch pin extending through an aperture in a cavity wall and into a receptacle in a wall of the display housing,

FIG. 4 is a fragmentary exploded view showing the manner, in which the solenoid and the touch contacts are mounted within the console,

FIG. 5 is a schematized illustration of a solenoid driving circuit, and

FIG. 6 is a schematized block diagram of components of the processor implemented video monitor including the latch system in accordance with the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to the drawings, wherein like numerals denote like components throughout, the reference numeral 10 denotes generally a video monitor comprising a display housing 12 and a console 14. A hinge assembly 16 pivotally interconnects the display housing 12 with the console 14 and is employed to guide the movement of the display housing 12 relative to the console 14 from a display housing stowage position, seated within an open stowage cavity 18 of the console (as illustrated in FIG. 2), to a viewing position depicted in FIG. 1, wherein a display panel 20 is at an appropriate viewing angle and distance relative to a viewer.

The video monitor 10 includes various controls and accessories such as an infrared remote control sensor 22, a membrane keyboard 24 for various manual input selections such as power, volume, channel, input source, menu, and the like. Auxiliary interior lights 26, input/output jacks 28 and a shallow concave finger well 30 having a pair of touch sensor contacts 32.

Referring now to FIG. 3 and FIG. 4, wherein the latch system 30 is illustrated in detail, the latch system 30 includes a solenoid 36 having a sliding latch core 38 with a detent pin 40 at its distal end. The detent pin 40 extends through an aperture 42 in a front wall of

the cavity 18. With the display housing 12 in its stowed position, as illustrated in FIG. 2 and FIG. 3, a receptacle, i.e. a recess or aperture 44, of a corresponding wall of the display housing 12 is in registration with the casing aperture 44 and the detent pin 40 engages and extends into the receptacle 44. An annular flange 46 formed on the sliding core 38 is engaged by a helical spring 48 to urge the sliding core 38 toward the cavity 18 and into the receptacle 44.

In accordance with the invention, a mounting plate 50 is employed to secure the solenoid 36 in position, with mounting screws extending through apertures in the mounting plate 50 and engaging a pair of mounting posts 60 formed in the interior of the console 14.

It should be noted that the solenoid 36 is positioned in registration with the well 32 and touch contacts 34. The touch contacts 34 extend from a pair of contact plates 52 through apertures 54 formed in the console 14. A suitable electrical lead 56 engages each contact plate and is secured thereto by a suitable mounting screw.

The contact plates 52 include apertures in registration with the mounting posts 60 and are positioned at the base of the mounting posts 60. A suitable electrical insulation layer is provided between the contact plates 52 and a solenoid frame.

It should be additionally noted that a position sensor switch 62 is carried on a circuit board 64 mounted within the casing 14 in registration with the stowage cavity 18.

A grommet 66, formed of rubber or other resilient material, extends through an aperture in an upper horizontal panel of the stowage cavity 18. The grommet 66 carries a

moveable rod 68 which is in registration with the position sensor switch 62. When the display housing 12 is stowed in the cavity 18, a surface of the housing 12 engages the grommet 66, causing the rod 68 to extend upwardly and actuate the position sensor switch 62.

The position sensor switch 62 is operatively connected to a processor 70, which receives input signals from the remote sensor 22 as well as the membrane keyboard 24. When the processor detects that the display housing 12 is in its stowed position, through interrogation of the position sensor switch 62, the processor proceeds 70 to disengage power supply to the driving circuitry of the display panel 20.

Similarly, when the processor 70 interrogates the switch 62 and detects that the solenoid 36 has been actuated and the display housing has been released from its stowed position, the processor 70 actuates the display panel driving circuit.

Referring now to FIG. 5 wherein a simplified, schematized illustration of a typical solenoid driving circuit is illustrated, it should be noted that pursuant to the invention, the processor 70 can effect actuation of the solenoid to cause the detent pin 40 to disengage from the housing aperture 44 and thus permit the display housing 12 to be operatively positioned for viewing. Such actuation could be provided responsive to a signal received from the infrared remote sensor 22 or the “power” button of the membrane keyboard 24.

Additionally, the processor is programmed to store, in a nonvolatile memory, a display housing position signal in the event the display housing 12 is in a deployed viewing

position at the time power is disconnected to the video monitor, as by a vehicle ignition switch. In the event a passenger or vehicle operator returns the display housing 12 to its stowed position while the power has been turned off, the processor 70 detects such change by interrogation of the position sensor switch 62 upon powering up and is programmed to automatically generate a solenoid actuation signal.

In the event of any occurrence wherein the processor determines that the solenoid 36 should be actuated, a processor generated solenoid activation signal appears at the base of a first transistor 72, causing such transistor to switch on, which causes a second transistor 74 to switch, thereby switching a third transistor 76 to a conductive state. This, in turn, effects the switching of a fourth transistor 78 which, in turn, effects the switching of a fifth transistor 80, resulting in supplying power to the solenoid 36.

Pursuant to the invention, engagement of the touch contacts 22 by a person's finger or other electrically conductive material effects the switching of the transistor 76 to a conductive state which switches the transistor 78, which effects switching of the transistor 80 for powering the solenoid 36.

Thus it will be seen that there is provided a latch system for a video monitor which achieves the various aspects, features and considerations of the present invention and which is well adapted to meet the conditions of practical usage.

As various changes might be made in the latch system for video monitor above set forth without departing from the spirit of the invention, it is to be understood that all matter herein described or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.